



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/426,087	10/22/1999	PAUL R. DRURY	27754/35306A	1386

7590

11/26/2002

MARSHALL O'TOOLE GERSTEIN
MURRAY & BORUN
6300 SEARS TOWER
233 SOUTH WACKER DRIVE
CHICAGO, IL 606066402

EXAMINER

FEGGINS, KRISTAL J

ART UNIT

PAPER NUMBER

2861

DATE MAILED: 11/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/426,087

Applicant(s)

DRURY ET AL.

Examiner

K. Feggins

Art Unit

2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 Sept 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 17.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 6, 8-9 & 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Applicant's Admitted Prior Art, (AAPA, Michaelis et al., EP 0277 703 A1, in the specification pg 6, lines 5-9, pg 8, lines 28-31).

Michaelis et al. (AAPA) discloses the following claimed limitations:

2/22-50 * a fluid chamber having actuator means actuatable by electrical signals to effect ejection of droplets from the fluid chamber (Abstract, col 13, lines 29-55, fig 9);

* drive circuit means/drive circuit (625) sends signals to electrodes (619 & 621)/ for supplying the electrical signals to the actuator means (col 13, line 45-col 14, line 12, fig 9)

* conduit means/channel/ for conveying droplet fluid to and from said fluid chamber (fig 9), said drive circuit means/electrodes/ being in substantial thermal contact with said conduit means/channels/ so as to transfer a substantial part of the heat generated in said drive circuit to said droplet fluid (col 10, lines 1-17, col 13, line 45-col 14, line 12, fig 9 and in the specification pg 6, lines 5-9, pg 8, lines 28-31).

Art Unit: 2861

* first conduit means for supplying droplet fluid to said fluid chamber and second conduit means for leading droplet fluid from said fluid chamber (Abstract, col 8, lines 8-17, col 10, lines 35-38, figs 1a & 9)

* wherein said drive circuit means is thermally connected to the second conduit means (col 7, line 41-col 8, line 17, figs 1a & 9)

* at least one droplet ejection unit (col 7, line 41-col 8, line 17, col 13, lines 29-56, figs 1a & 9)

* a plurality of liquid chambers/channels (613), actuator means (603) and a plurality of nozzles (618) arranged in a row, said actuator means being actuable to eject a droplet of fluid from a fluid chamber through a respective nozzle (col 13, line 29-col 14, line 12, fig 9)

* a support member/nozzle plate, (617) for said at least one nozzle ejection unit (col 7, line 50-col 8, line 17, col 13, line 29-col 14, line 12, figs 1a & 9),

* said support member/nozzle plate/ comprising at least one droplet fluid passageway communication with said plurality of fluid chambers and arranged so as to convey droplet fluid to or from said fluid chambers in a direction substantially parallel to said nozzle row and to transfer substantial part of the head generated during droplet ejection to said conveyed droplet fluid (col 7, line 41-col 8, line 17, figs 1a, 7 & 9).

Art Unit: 2861

* wherein the droplet fluid passageway comprises respective portions for conducting droplet fluid into and away from each fluid chamber (col 7, line 41-col 8, line 17, figs 1a, 7 & 9).

* wherein the cross-section of support member/nozzle plate/ is wider in the direction of ink ejection from the nozzles than in the direction of the nozzle row (figs 9)

* a plurality of said droplet ejection units, the support member/nozzle plate/ supporting the droplet ejection units side by side in the direction of the nozzle rows, the support member comprising at least one droplet fluid passage way communication with at least two of said ejection units and arranged so as to convey droplet fluid to or from said ejection units in a direction substantially parallel to said nozzle rows and to transfer a substantial part of the heat generated during droplet ejection to said conveyed droplet fluid (col 10, lines 1-17, col 13, line 45-col 14, line 12, figs 1a, 7 & 9, and see the specification pg 6, lines 5-9, pg 8, lines 28-31).

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Art Unit: 2861

5. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claims 13 & 15-17 are rejected under 35 U.S.C. 102(e) as being anticipated Aoki (US 5,976,303).

Aoki disclose the following claimed limitations:

- * droplet deposition apparatus/ink jet print head/ (Abstract)

- * a fluid chamber (3), at least part of which is formed from a first material having a first coefficient of thermal expansion, said chamber being associated with actuator means (2) actuable to eject a droplet from the chamber and having a port/supply port (7)/ for the inlet of droplet fluid thereto (col 3, lines 51-62, col 5, lines 6-47, figs 2)

- * a support member/nozzle plate 4/ for said fluid chamber (3) (fig 2)

- * including a passageway/ink channels/ for supply of droplet liquid to said port(40), the support member being defined at least in part by a second material having a second coefficient of thermal expansion greater than said first coefficient (col 3, lines col 5, lines 6-47, fig 2)

- * means for attaching the fluid chamber to the support member in order to substantially avoid transfer of thermal deformation of the support member to said fluid chamber(col 3, line 63-col 4, line 3, figs 2-6).

Art Unit: 2861

* wherein the or each fluid chamber comprises a channel formed in a body of piezoelectric material and closed by a cover member substantially thermally matched to the piezoelectric material (col 3, lines 51-62, col 5, lines 12, 28-46, figs 2-4 & 8)

* wherein ink supply ports are formed in said cover (col 3, lines 51-62, col 4, lines 60-63, fig 2a)

* wherein at least one ink ejection nozzle/ink opening/ is formed in said body of piezoelectric material (col 3, lines 51-62, col 4, lines 60-63, fig 2a)

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 4-5 & 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art, (AAPA, Michaelis et al. EP 0277 703 A1, in the specification pg 6, lines 5-9, pg 8, lines 28-31) in view of Allen et al. (EP 0 564 102 A2) **AAPA, Michaelis et al. disclose all of the claimed limitations except for the following:**

* wherein the drive circuit is incorporated within an integrated circuit package/ chips, of substantially cuboid form in which at least some of the faces are rectangles each having a surface area, a face other than that face having the smallest surface area

Art Unit: 2861

being arranged so as to lie substantially parallel to the direction of fluid flow in that part of the conduit closest to said face, and to be in substantial thermal contact with the fluid

* wherein the face having the greatest surface area is arranged so as to lie parallel to the direction of fluid flow

* wherein the droplet fluid passageway occupies the majority of the cross-sectional area of the support member

Allen et al. disclose the following claimed limitation:

* wherein the drive circuit is incorporated within an integrated circuit package/chips, of substantially cuboid form in which at least some of the faces are rectangles each having a surface area, a face other than that face having the smallest surface area being arranged so as to lie substantially parallel to the direction of fluid flow in that part of the conduit closest to said face, and to be in substantial thermal contact with the fluid (col 39, lines 53-67, col 40, lines 42-48) for the purpose of enabling printing at virtually any location on the printing medium

* wherein the face having the greatest surface area is arranged so as to lie parallel to the direction of fluid flow (col 5, lines 21-55, figs 1 a) for the purpose of increasing the speed of printing per line.

Art Unit: 2861

* wherein the droplet fluid passageway occupies the majority of the cross-sectional area of the support member (figs 1a, 4, 5) for the purpose of reducing cost of printheads construction.

It would have been obvious at the time of the invention was made to a person having ordinary skill in the art to utilize a drive circuit that is incorporated within an integrated circuit package, of substantially cuboid form in which at least some of the faces are rectangles each having a surface area, a face other than that face having the smallest surface area being arranged so as to lie substantially parallel to the direction of fluid flow in that part of the conduit closest to said face, and to be in substantial thermal contact with the fluid; a face having the greatest surface area is arranged so as to lie parallel to the direction of fluid flow and a droplet fluid passageway occupies the majority of the cross-sectional area of the support member, taught by Allen et al. into Michaelis et al. (AAPA) for the purposes of enabling printing at virtually any location on the printing medium, increasing the speed of printing per line and reducing cost of printheads construction.

9. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art, (AAPA, Michaelis et al., EP 0277 703 A1, in the specification pg 6, lines 5-9, pg 8, lines 28-31) in view of Aoki (US 5,976,303).

AAPA, Michaelis et al. discloses all the claimed limitations except for the following:

Art Unit: 2861

* wherein the support member comprises material having a higher thermal conductivity than said at least one droplet ejection unit.

* means for attaching said at least one droplet ejection unit to the support member in order to substantially avoid transfer of thermal deformation of the support member to said at least one droplet ejection unit

Aoki discloses the following claimed limitations:

* wherein the support member/nozzle plate/ comprises material having a higher thermal conductivity than said at least one droplet ejection unit (col 5, lines 6-46, figs 2-6) for the purpose of attaining improved ink ejection and printing quality.

* means for attaching said at least one droplet ejection unit to the support member in order to substantially avoid transfer of thermal deformation of the support member to said at least one droplet ejection unit (col 3, line 63-col 4, line 3, figs 2-6) for the purpose of accurately positioning the nozzles in correspondence with the ink chambers.

It would have been obvious at the time of the invention was made to a person having ordinary skill in the art to utilize a support member with material having a higher thermal conductivity than said at least one droplet ejection unit and a means for attaching said at least one droplet ejection unit to the support member, taught by Aoki into Michaelis et al. (AAPA) for the purposes of attaining improved ink ejection and

Art Unit: 2861

printing quality, and accurately positioning the nozzles in correspondence with the ink chambers.

10. Claim 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (US 5,976,303) in view of Silverbrook (6,171,875 B1).

Aoki discloses all of the claimed limitations except for the following::

* wherein the attachment means comprises resilient bonding means for bonding the fluid chamber to the support member

Silverbrook discloses the following claimed limitations:

* wherein the attachment means comprises resilient bonding means for bonding the fluid chamber to the support member (col 3, lines 36-67, col 4, lines 1-5. figs 1-3) for the purpose of rapidly increasing the pressure in the nozzle chamber.

It would have been obvious at the time of the invention was made to a person having ordinary skill in the art to utilize attachment means the consist of a resilient bonding means for bonding the fluid chamber to the support member, taught by Silverbrook into Aoki for the purpose of rapidly increasing the pressure in the nozzle chamber.

Response to Arguments

11. Applicant's arguments filed 10 Sept 2002 have been fully considered but they are not persuasive.

In response to Applicant's argument that Michaelis et al. does not disclose means for conveying droplet fluid to and from the fluid chamber is acknowledged.

However, Michaelles does disclose fluid ejected from the nozzle (as stated in your response, page 2, para 2). Furthermore, the fluid travels down the channel/chamber to the nozzle and then ejected out. In other words, the fluid is conveyed **to** the channel/chamber and **from** the channel/chamber it is conveyed to the nozzle (see figure 9, col 13, line 57-col 14, line 5). The ink supplied to the channel by way of an ink tube supply, which is connected to an ink reservoir (col 8, lines 8-12).

In response to Applicant's argument that Michaelles et al. does not disclose drive circuit means being in substantial thermal contact with the conduit means so as to transfer a substantial part of the heat generated in the drive circuit to the droplet fluid is acknowledged. However, Michaelles et al. does disclose an actuator (603 of fig 9) with electrodes on both sides (619 of fig 9) with a drive circuit (625 of fig 9). In operation a voltage/heat/electricity/signal/ is applied to the electrodes in each channel. The drive circuit means consist of not only the drive circuit, but also the electrodes. The electrodes are heated/shown by the displacement of them/ in accords to the voltage signal supplied by the drive circuit and generates pressure in the ink in the channel. The pressure causes the ink ejection. Therefore, there is thermal contact, by way of the electrodes, with the conduit means so as to transfer a substantial part of the heat generated in the drive circuit to the droplet fluid.

In response to Applicant's argument that Michaelles et al. does not disclose ...fluid passageway communication with said plurality of fluid chambers... is acknowledged. However, the fluid travels from the ink reservoir by way of a tube, passageway, to the

Art Unit: 2861

plurality of fluid channels/chambers to the nozzles, thereby being in communication with the plurality of fluid channels.

In response to Applicant's argument that Aoki does not disclose a port for the inlet of droplet fluid thereto is acknowledged. However, Aoki does disclose an inlet port/ink supply opening/ (fig 2a) that is formed with the ink channels.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sicking (US 3,930,260) discloses an apparatus for applying a liquid in droplets to a surface. Ishinaga et al. (US 6,290,334 B1) disclose a recording apparatus, recording head and substrate therefore. Swanson et al. (US 5,896,153) disclose a leak resistant tow-material frame for an ink jet print cartridge.

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Communication with the USPTO

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Feggins whose telephone number is 703-306-4548.


The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Fuller can be reached on 703-308-0079. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

RF

November 21, 2002


LAMSON NGUYEN
PRIMARY EXAMINER 11/21/02